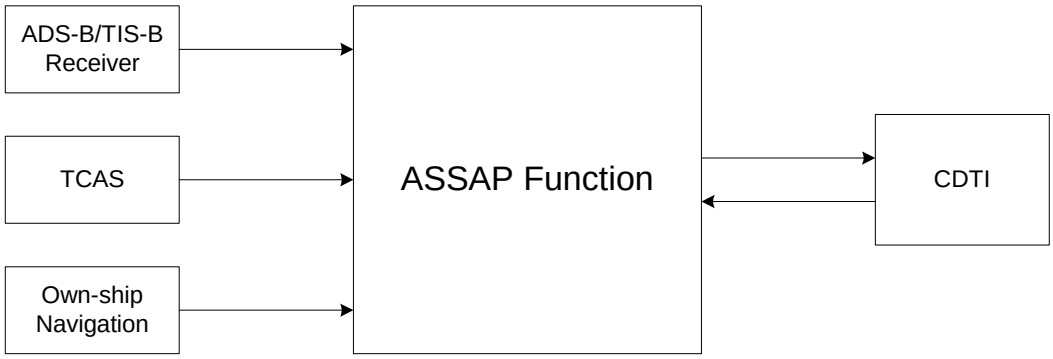
2.2.2 ASSAP Input / Output Requirements

This section summarizes ASSAP input / output interfaces to other subsystems as shown ~~in~~ below.



The following subsections contain basic ASSAP input / output requirements that are required to support the EV Acquisition application as a minimum. The CD, ASSA, FAROA, and EV Approach applications are optional; but when they are implemented, the requirements designated for these applications must be met.

2.2.2.1 ASSAP Input Requirements from ADS-B/TIS-B Receiver

This section defines the traffic state data and traffic ID/status data supplied to the ASSAP function from the ADS-B/TIS-B receiver. Reception of various data links will be possible which may include 1090 MHz Extended Squitter, UAT, or VDL-4. The requirements specified in this section are meant to define the minimum required traffic data set needed to support ASSAP. Specific ADS-B/TIS-B receiver and data link requirements can be found in the MOPS for 1090 MHz (RTCA DO-260A), UAT (RTCA DO-282), and VDL-4 SARPS (ED-108).

2.2.2.1.1 Traffic State Data Input Requirements

Traffic state data is information describing the aircraft state that generally changes rapidly (e.g. position, altitude, and velocity). The following traffic state data is required for ASSAP.

1. The ASSAP function **shall** receive the Time of Applicability (TOA) of the received traffic state data from the ADS-B/TIS-B receiver.

Note: The Time of Applicability is based on the time of message reception but varies by the type of data link.

2. The ASSAP function **shall** receive the Horizontal Position based on WGS-84 latitude/longitude from the ADS-B/TIS-B receiver.

3. The ASSAP function **shall** receive the Horizontal Velocity from the ADS-B/TIS-B receiver when available.

Note: The magnitude of the Horizontal Velocity can also be used for ground speed. The Cartesian coordinates of velocity (e.g. north and east velocity components) can also be used to calculate true track angle but should be considered invalid per Section 2.2.2.5.1.12 Traffic Track Angle.

4. For the ASSA and FAROA applications, the ASSAP function **shall** receive the Ground Speed when on Surface from the ADS-B/TIS-B receiver when available.

5. The ASSAP function **shall** receive the Pressure Altitude from the ADS-B/TIS-B receiver when available.

6. The ASSAP function **shall** receive the WGS-84 Height above Ellipsoid (HAE) Geometric Altitude from the ADS-B/TIS-B receiver when available.

7. The ASSAP function **shall** receive the Vertical Rate from the ADS-B/TIS-B receiver when available.

8. The ASSAP function **shall** receive the Vertical Rate Type (i.e. Geometric or Barometric) from the ADS-B/TIS-B receiver when available.

9. The ASSAP function **shall** receive the Heading when on Surface (i.e. true or magnetic heading) from the ADS-B/TIS-B receiver when available.

10. For ADS-B/TIS-B traffic reports based on DO-260A and DO-282A Version 1, the ASSAP function **shall** receive the Navigation Integrity Category (NIC) from the ADS-B/TIS-B receiver when available.

11. The ASSAP function **shall** receive the Air/Ground State from the ADS-B/TIS-B receiver when available.

Note: The ADS-B/TIS-B receiver usually determines the traffic air/ground state based on receiving either surface position reports (ground state) or airborne position reports (air state).

2.2.2.1.2 Traffic ID/Status Data Input Requirements

Traffic ID/status data is information about the aircraft that generally changes less frequently than the traffic state data (e.g. Flight ID and Participant Address). The following traffic ID/status data is required for ASSAP.

1. The ASSAP function **shall** receive the Flight ID (up to 8 alphanumeric characters in length) from the ADS-B/TIS-B receiver when available.

2. The ASSAP function **shall** receive the Participant Address from the ADS-B/TIS-B receiver.

3. The ASSAP function **shall** receive the Participant Address Qualifier (indicating whether the Participant Address is a 24-bit ICAO address or another kind of address) from the ADS-B/TIS-B receiver when available.

4. The ASSAP function **shall** receive the Emitter Category (e.g. light, small aircraft, rotorcraft, etc.) from the ADS-B/TIS-B receiver when available.

5. (Optional) The ASSAP function **shall** receive the A/V Length and Width Code from the ADS-B/TIS-B receiver when available.

The CDTI may have removed this requirement? If so, remove this requirement.

6. For ADS-B~~/TIS-B~~ traffic reports based on DO-260 ~~and DO-282~~ Version 0, the ASSAP function **shall** receive the Navigation Uncertainty Category for Position (NUC_P) from the ADS-B~~/TIS-B~~ receiver when available.

7. For ADS-B~~/TIS-B~~ traffic reports based on DO-260 ~~and DO-282~~ Version 0, the ASSAP function **shall** receive the Navigation Uncertainty Category for Rate (NUC_R) from the ADS-B~~/TIS-B~~ receiver when available.

8. For ADS-B/TIS-B traffic reports based on DO-260A Version 1 and DO-282A ~~Version 1~~, the ASSAP function **shall** receive the Navigational Accuracy Category for Position (NAC_P) from the ADS-B/TIS-B receiver when available.

9. For ADS-B/TIS-B traffic reports based on DO-260A Version 1 and DO-282A ~~Version 1~~, the ASSAP function **shall** receive the Navigational Accuracy Category for Velocity (NAC_V) from the ADS-B/TIS-B receiver when available.

10. For ADS-B/TIS-B traffic reports based on DO-260A Version 1 and DO-282A ~~Version 1~~, the ASSAP function **shall** receive the Surveillance Integrity Level (SIL) from the ADS-B/TIS-B receiver when available.

2.2.2.2 ASSAP Input Requirements from TCAS

The following TCAS traffic information is required for systems integrated with TCAS.

1. The ASSAP function **shall** be capable of receiving a traffic capacity of at least 30 tracks from TCAS.

Note: A traffic capacity of 30 tracks is based on supporting the TCAS II tracking capacity for active surveillance (Reference RTCA DO-185A TCAS II MOPS Section 2.2.4.6.1 Surveillance Target Track Capacity).

2. The ASSAP function **shall** receive the TCAS Report Time from TCAS if available.

3. The ASSAP function **shall** receive the TCAS Track ID from TCAS.

Note: The TCAS Track ID is a unique identifier that identifies the traffic for which data is being provided.

4. The ASSAP function **shall** receive the Mode S Address from TCAS when available.

5. The ASSAP function **shall** receive the Range from TCAS.

Note: ASSAP designers must consider in its implementation that the type of range from TCAS may be represented as either slant or horizontal range relative to own-ship's position.

6. The ASSAP function **shall** receive the Bearing from TCAS when available.

7. The ASSAP function **shall** receive the Altitude from TCAS when available.

8. The ASSAP function **shall** receive the Altitude Rate from TCAS when available.

9. The ASSAP function **shall** receive the TCAS Alert Status (i.e. no threat, proximity traffic, traffic advisory, resolution advisory) from TCAS when available.

10. The ASSAP function **shall** receive the TCAS Vertical Sense from TCAS when available.

Note: The TCAS Vertical Sense is an indication whether the traffic vertical direction is climbing, descending, or level.

2.2.2.3 ASSAP Input Requirements from Own-ship Navigation

This section defines the own-ship state data and own-ship quality data supplied to the ASSAP function from the own-ship navigation sources.

~~Note 1:~~ The received own-ship navigation data sources ~~**should**~~ **shall** be ~~selected per DO-302 STP MOPS~~the same as the data sources transmitted out by the ADS-B transmitter per RTCA DO-302 STP MOPS.

2.2.2.3.1 Own-ship State Data Input Requirements

Own-ship state data is information describing the own-ship state that generally changes rapidly (e.g. position, altitude, and velocity). The following own-ship state data is required for ASSAP.

1. The ASSAP function **shall** receive the Time of Applicability (TOA) of the received own-ship state data from the own-ship navigation sources.

Note: The Time of Applicability is based on the time of data reception.

2. The ASSAP function **shall** receive the Horizontal Position based on WGS-84 latitude/longitude from the own-ship navigation sources.

3. The ASSAP function **shall** receive the Horizontal Velocity ~~with respect to WGS-84~~ from the own-ship navigation sources when available.

Note: The magnitude of the Horizontal Velocity can also be used for ground speed. The Cartesian coordinates of velocity (e.g. north and east velocity components) can also be used to calculate true track angle but should be considered invalid per Section 2.2.2.5.2.3 Own-ship Track Angle.

4. The ASSAP function **shall** receive the True Track Angle from the own-ship navigation sources when available.

Note: Based on the type of own-ship navigation source, the accuracy of its true track angle should be considered below some ground speed threshold.

5. For the ASSA and FAROA applications, the ASSAP function **shall** receive the Ground Speed from the own-ship navigation sources when available.

6. The ASSAP function **shall** receive the Pressure Altitude from the own-ship navigation sources when available.

7. The ASSAP function **shall** receive the WGS-84 Height above Ellipsoid (HAE) Geometric Altitude from the own-ship navigation sources when available.

8. The ASSAP function **shall** receive the Pressure Altitude Rate from the own-ship navigation sources when available.

9. The ASSAP function **shall** receive the WGS-84 Height above Ellipsoid (HAE) Geometric Altitude Rate from the own-ship navigation sources when available.

10. The ASSAP function **shall** receive the Heading when on Surface (i.e. true or magnetic heading) from the own-ship navigation sources when available.

2.2.2.3.2 Own-ship Quality Data Input Requirements

Own-ship quality data is very similar to traffic quality data; however, as the information comes directly from the own-ship navigation sensor it is not yet categorized into NIC, NAC and SIL values. The ASSAP function will receive the data as it is output from the STP subsystem per RTCA DO-302 STP MOPS. The following own-ship quality data is required for ASSAP.

1. The received own-ship quality data **shall** be based on the state data quality determined per RTCA DO-302 STP MOPS.

Note: The state data quality is determined based on the type of source that is available and also takes into account limiting factors.

2. The ASSAP function **shall** receive the Participant Address from the own-ship navigation sources when available.

3. (Optional) The ASSAP function **shall** receive the A/V Length and Width Code from the own-ship navigation sources when available.

The CDTI may have removed this requirement? If so, remove this requirement.

4. The ASSAP function **shall** receive the Horizontal Position Accuracy ($HFOM_{STP}$) from the own-ship navigation sources when available.

5. The ASSAP function **shall** receive the Vertical Position Accuracy ($VFOM_{STP}$) from the own-ship navigation sources when available.

6. The ASSAP function **shall** receive the Horizontal Velocity Accuracy ($HFOM_{RSTP}$) from the own-ship navigation sources when available.

7. The ASSAP function **shall** receive the Vertical Velocity Accuracy ($VFOM_{RSTP}$) from the own-ship navigation sources when available.

8. The ASSAP function **shall** receive the Horizontal Position Integrity Containment Region (HPL_{STP}) from the own-ship navigation sources when available.

9. The ASSAP function **shall** receive the Vertical Position Integrity Containment Region (VPL_{STP}) from the own-ship navigation sources when available.

10. The ASSAP function **shall** receive the Surveillance Integrity Level (SIL_{STP}) from the own-ship navigation sources when available.

2.2.2.4 ASSAP Input Requirements from CDTI

ASSAP input requirements from the CDTI are defined in Section 2.3.1.4 Outputs from CDTI to ASSAP. The ASSAP function **shall** be capable of receiving and processing the CDTI outputs to ASSAP as defined in Section 2.3.1.4 Outputs from CDTI to ASSAP.

2.2.2.5 ASSAP Output Requirements to CDTI

This section defines the traffic, alert, own-ship, and ASSAP status output requirements from the ASSAP function to the CDTI.

2.2.2.5.1 Traffic Information Output Requirements

The following subsections contain traffic information output requirements from the ASSAP function to the CDTI.

2.2.2.5.1.1 Traffic Output Capacity

The ASSAP function **shall** ~~be capable of~~ provid~~ing~~ e a traffic capacity of at least 60 tracks to the CDTI.

Note: A traffic capacity of 60 tracks is based on supporting 30 for surface traffic and 30 for airborne traffic.

2.2.2.5.1.2 Traffic Output Priority

The ASSAP function **shall** provide the highest priority tracks to the CDTI based on the following priority:

1. Resolution Advisory (for systems integrated with TCAS)

2. ASA Application Warning Alerts

~~2.~~3. Traffic Advisory (for systems integrated with TCAS)

4. ASA Application Caution Alerts

~~3.~~5. Proximate Traffic (for systems integrated with TCAS)

~~4.~~6. ASA Application Advisory Alerts

~~5.~~7. Coupled Traffic

~~6.~~8. Selected Traffic

~~7.~~9. Range (closer ranges are of higher priority)

~~2.2.2.5.1.3TCAS Only Traffic during ASSAP Fault~~

~~TCAS trafficT from the TCAS function **shall** be provided automatically or by crew selection to the CDTI during an ASSAP Fault.~~

~~2.2.2.5.1.4TCAS Sensitivity Level~~

~~the ASSAP function **shall** be capable of providing the TCAS Sensitivity Level to the CDTI for all traffic.~~

~~For tracks that are correlated with TCAS tracks and for TCAS only tracks, the TCAS Sensitivity Level **shall** be set to the value provided by the TCAS function.~~

~~For tracks that are not correlated with TCAS tracks, the TCAS Sensitivity Level **shall** be set to 'No SL reported'.~~

~~2.2.2.5.1.5~~2.2.2.5.1.3 [t1]**Track ID**

The ASSAP function **shall** ~~be capable of~~ provid~~inge~~ a ~~a~~ Track ID for traffic sent to the ~~CDTI~~ CDTI~~for all traffic.~~

When new traffic has been added due to traffic being dropped, the new traffic **shall** use a new Track ID identifier (not the same Track ID identifier that was used for the dropped traffic). Otherwise, the CDTI may mistake the new traffic as the dropped traffic. The only exception is when the new traffic was the same track that was previously dropped.

Note: The Track ID is a unique identifier that identifies the traffic for which data is being provided.

~~2.2.2.5.1.6~~2.2.2.5.1.4 **Flight ID**

For the CD and EV App. applications ~~(as a minimum)~~, the ASSAP function **shall** ~~be capable of~~ provid~~inge~~ a Flight ID for traffic sent to the CDTI ~~for all traffic~~when available.

Note: Flight ID is also desired (optional) for the EV Acq., ASSA, and FAROA applications.

~~2.2.2.5.1.7~~2.2.2.5.1.5 **Traffic Category (Emitter Category)**

For the EV App. application ~~(as a minimum)~~, the ASSAP function **shal**l ~~be capable of~~ provid~~inge~~ a Traffic Category for traffic sent to the CDTI ~~for all traffic~~when available.

Note: Traffic Category is also desired (optional) for the EV Acq., CD, ASSA, and FAROA applications.

~~2.2.2.5.1.8~~2.2.2.5.1.6 **Traffic Length/Width Codes (Desired/Optional)**

For the ASSA and FAROA applications, the ASSAP function may ~~be capable of~~ provid~~inge~~ Traffic Length/Width Codes for traffic sent to the CDTI ~~for all traffic~~when available.

The CDTI may have removed this requirement? If so, remove this section.

~~2.2.2.5.1.9~~2.2.2.5.1.7 Traffic Horizontal Position

The ASSAP function **shall** ~~be capable of~~ provid~~e~~ing ~~the~~ Traffic Horizontal Position for traffic sent to the CDTI ~~for all traffic~~.

Traffic Horizontal Position **shall** be provided as either WGS-84 latitude/longitude or relative range and bearing referenced from own-ship position.

Traffic relative range and bearing from own-ship **shall** be calculated based on the Own-ship Horizontal Position source defined in Section 2.2.2.5.3.1 Own-ship Horizontal Position.

~~Comment: Need to look at this carefully when integrated on MFDs.~~

~~2.2.2.5.1.10~~2.2.2.5.1.8 Traffic Horizontal Velocity

For the EV App. application ~~(as a minimum)~~, the ASSAP function **shall** ~~be capable of~~ provid~~inge~~ ~~the~~ Traffic Horizontal Velocity for traffic sent to the CDTI ~~for all traffic~~when available.

Traffic Horizontal Velocity **shall** be provided as either Cartesian coordinates of velocity (e.g. north and east velocity components) or as the magnitude of the traffic horizontal velocity (traffic ground speed).

Note 1: Traffic Horizontal Velocity is used for displaying traffic velocity vectors or ground speed.

~~*Note 2: For the EV App. application, traffic ground speed may also be used for display when the Traffic Closure Rate is not used.*~~

Note ~~3~~2: Traffic Horizontal Velocity is also desired (optional) for the EV Acq., CD, ASSA, and FAROA applications.

The CDTI MOPS needs to consider adding a requirement for displaying either Closure Rate or Ground Speed in order to satisfy the EV App. application.

~~2.2.2.5.1.11~~2.2.2.5.1.9 Traffic Closure Rate

For the EV App. application ~~(as a minimum)~~, ~~if traffic and own-ship ground speed is not provided, then~~ the ASSAP function **shall** ~~be capable of~~ provid~~inge~~ ~~the~~ Traffic Closure Rate for the coupled traffic sent to the CDTI ~~for the coupled traffic[12].~~when available.

~~Note 1: The ASSAP function can either provide the traffic closure rate or provide the traffic and own-ship ground speed to satisfy the EV App. application.~~

Traffic Closure Rate **shall** be calculated based on the ~~horizontal component~~slant range ~~of the closure rate~~ from own-ship position.

Note: Traffic Closure Rate may also be used for the EV Acq., CD, ASSA, and FAROA applications.

~~2.2.2.5.1.12~~2.2.2.5.1.10 Traffic Altitude

The ASSAP function **shall** ~~be capable of providing~~provide ~~the~~ Traffic Altitude for airborne traffic sent to the CDTI when available ~~for all airborne traffic~~.

Traffic Altitude **shall** be provided as either actual pressure altitude or relative altitude ~~relative~~ to own-ship altitude.

Note 1: Traffic Altitude is not required for surface traffic.

Note 2: Traffic Altitude is used for displaying relative or actual altitudes for traffic. Own-ship pressure altitude is also needed for the CDTI to calculate traffic relative altitude when traffic actual pressure altitude is only provided or to calculate traffic actual altitude when traffic relative altitude is only provided.

~~2.2.2.5.1.13~~2.2.2.5.1.11 Traffic Geometric Altitude (Optional)

The ASSAP function may provide Traffic Geometric –Altitude for traffic sent to the CDTI when available ~~for all airborne traffic~~.

Traffic Geometric Altitude **shall** be provided as WGS-84 Height above Ellipsoid (HAE) geometric altitude.

Note 1: Traffic Geometric Altitude is not needed for surface traffic.

Note 2: Traffic Geometric Altitude may be used for displaying relative ~~geometric altitudes for traffic~~altitude when Pressure Altitude is unavailable.~~Traffic Geometric Altitude should be provided as Height above Ellipsoid (HAE) altitude.~~

~~2.2.2.5.1.14~~2.2.2.5.1.12 Traffic Track Angle (Traffic Directionality)

The ASSAP function **shall** ~~be capable of~~ provid~~inge~~ ~~the~~ Traffic Track Angle for traffic sent to the CDTI when available ~~for all traffic~~.

Traffic Track Angle **shall** be provided as true track angle.

When true track angle is determined based on the Cartesian coordinates of velocity (e.g. north and east velocity components), the Traffic Track Angle **shall** be considered invalid when the accuracy may be in question below the determined velocity threshold in the following table:

(Jonathan will provide a velocity threshold table for invalidating track angle based on the reported NACv)

Note ~~1~~: Traffic Track Angle is used for calculating Traffic Directionality.

~~*Note 2: The quality of traffic directionality is not required (e.g. degraded). But, the ASSAP function should include whether the traffic track angle data is valid or invalid. When true track angle is determined based on the Cartesian coordinates of velocity (e.g. north and east velocity components), the accuracy may be in question below some value (e.g. below 20 kts); therefore, the traffic track angle data should be considered invalid.velocity threshold table for invalidating track angle based on the reported NACv*~~

~~**2.2.2.5.1.15**~~**2.2.2.5.1.13 Traffic Vertical Direction**

The ASSAP function **shall** ~~be capable of~~ provid~~inge~~ ~~the~~ a Traffic Vertical Direction for airborne traffic sent to the CDTI when available ~~for all airborne traffic~~.

Traffic Vertical Direction **shall** be provided as either actual traffic vertical rate or as an indication whether the traffic vertical direction is climbing, descending, or level.

Note 1: Traffic Vertical Direction is not required for surface traffic.

Note 2: Traffic Vertical Direction is used for displaying vertical direction for traffic (e.g. up or down arrow typically based on exceeding +/- 500 fpm).

Note 3: Based on the RTCA DO-302 STP MOPS, the received traffic vertical rate will be based on geometric vertical rate in most cases.

~~**2.2.2.5.1.16**~~**2.2.2.5.1.14 Traffic Ground Status**

~~For the ASSA and FAROA applications(as a minimum), t~~The ASSAP function **shall** ~~be capable of~~ provid~~eing~~ ~~thea~~ Traffic Ground Status for traffic sent to the CDTI ~~for all traffic~~.

Note ~~1~~: Traffic Ground Status is used for differentiating between airborne and surface traffic on the display.

~~*Note 2: Traffic Ground Status is also desired (optional) for the EV Acq. application.*~~

~~**2.2.2.5.1.17Traffic Source (Desired/Optional)**~~

~~The ASSAP function may provide the Traffic Source to the CDTI for all traffic.~~

~~*Note: Traffic Source may be used for differentiating between ADS-B, TCAS, ADS-R, and TIS-B traffic on the display.*~~

~~**2.2.2.5.1.18**~~**2.2.2.5.1.15 Traffic TCAS Correlated Status**

For systems integrated with TCAS, t~~T~~he ASSAP function **shall** ~~be capable of~~ provid~~inge~~ a ~~the~~ Traffic TCAS Correlated Status for traffic sent to the CDTI ~~for all traffic~~.

Note: Traffic TCAS Correlated Status indicates that the ~~Traffic~~ traffic ~~Source~~ source (i.e. ADS-B, ADS-R, or TIS-B track) is correlated with an existing TCAS track or the traffic source is TCAS.

~~2.2.2.5.1.19~~2.2.2.5.1.16 Traffic ~~Quality for Applications~~Application Capability

The ASSAP function **shall** ~~be capable of~~ provid~~ing~~e a Traffic ~~Quality for Applications~~Application Capability ~~for traffic sent~~ to the CDTI ~~for all traffic~~.

~~As a minimum, the~~The Traffic ~~Quality for Applications~~Application Capability ~~indication~~ **shall** include that the traffic application capability ~~quality~~ is either Invalid or Good Performance.

Note 1: The Traffic ~~Quality for Applications~~Application Capability ~~should be provided for all available applications (not just the active applications). An indication that the traffic quality~~ is of Degraded Performance is optional.

Note 2: For the EV Acq. application, the traffic ~~quality~~ application capability ~~states represent~~represents the following (EV Acq. is for airborne traffic and for surface traffic when not overlaid over an airport map):

1. *Invalid: Traffic not displayed; traffic does not meet the minimum performance criteria for display. This traffic may not be transmitted and may be replaced by an existing correlated TCAS track.*

In the Best Track Selection section, verify that there is a requirement to send the correlated TCAS track in this condition.

2. *Degraded Performance (Optional): Traffic degraded performance accuracy; traffic meets the degraded performance criteria for display.*

3. *Good Performance: Traffic good performance accuracy; traffic meets the good performance criteria for display.*

Note 3: For the CD application, the traffic application capability represents ~~traffic quality states represent~~ the following:

1. *Invalid: Traffic not qualified to alert; traffic does not meet the minimum performance criteria for alerting.*

2. *Degraded Performance (Optional): ~~Traffic qualified to alert, but with degraded performance~~N/A.*

3. *Good Performance: Traffic qualified to alert~~t with good performance~~.*

Note 4: For the ASSA and FAROA applications, the traffic application capability represents ~~quality states represent~~ the following (ASSA and FAROA are for surface traffic when overlaid over an airport map):

1. *Invalid: Traffic not ~~displayed~~qualified for ASSA and FAROA~~; traffic does not meet the minimum performance criteria for display. This traffic may not be transmitted and if airborne may be replaced by an existing correlated TCAS track.~~*

2. *Degraded Performance (Optional): ~~Traffic degraded performance accuracy; traffic meets the degraded performance criteria for display.~~Traffic qualified for ASSA and FAROA, but with degraded performance.*

3. *Good Performance:* ~~*Traffic good performance accuracy; traffic meets the good performance criteria for display*~~*Traffic qualified for ASSA and FAROA*.

Note 5: For the EV App. application, the traffic application capability represents ~~*quality states represent*~~ *the following:*

1. *Invalid: Traffic not qualified for EV App*~~*to couple traffic does not meet the minimum performance criteria for the coupled application*~~.

2. *Degraded Performance (Optional): Traffic qualified* ~~*to couple*~~*for EV App, but with degraded performance* ~~*for the coupled application*~~.

3. *Good Performance: Traffic qualified* ~~*to couple*~~*for EV App*~~*, with good performance for the coupled application*~~.

~~2.2.2.5.1.20~~2.2.2.5.1.17 Traffic Selected Status (Optional)

The ASSAP function may provide a Traffic Selected Status for traffic sent to the CDTI when available ~~for all traffic~~.

Note: Traffic Selected Status may be used for systems that ~~*provide*~~ *require feedback from the ASSAP function to the CDTI on which traffic is selected.*

~~2.2.2.5.1.21~~2.2.2.5.1.18 Traffic Coupled Status (Optional)

The ASSAP function may provide a Traffic Coupled Status for traffic sent to the CDTI when available ~~for all traffic~~.

Note: Traffic Coupled Status may be used for systems that ~~*provide*~~*require feedback from the ASSAP function to the CDTI on which traffic is coupled. This may be important for ASSAP implementations that only provide traffic data for the coupled traffic (e.g. Traffic Closure Rate for the EV App. application). This may not be important for ASSAP implementations that send Traffic Closure Rate for all traffic to the CDTI.*

~~2.2.2.5.1.22~~2.2.2.5.1.19 [t3]Alert Output Requirements

The following subsections contain alert output requirements from the ASSAP function to the CDTI.

Note: Currently the alerts are only associated with traffic for the CD application and for systems integrated with TCAS.

~~2.2.2.5.1.23~~2.2.2.5.1.20 Traffic ASA Application Alerts

For the CD application, the ASSAP function **shall** ~~be capable of~~ provid~~inge~~ Traffic CAZ and ~~,~~ CDZ~~,~~ alerts ~~and Low Level Alerts~~for traffic sent to the CDTI when available ~~for all traffic~~.

Note: CD Low level alerts are optional.

~~2.2.2.5.1.24~~2.2.2.5.1.21 [t4] **Traffic TCAS Alert Status**

For systems integrated with TCAS, the ASSAP function **shall** ~~be capable of~~ provid~~inge the~~ a Traffic TCAS Alert Status for traffic sent to the CDTI when available ~~for all traffic~~.

~~Note:~~ Traffic ~~Sources~~ sources (~~e.g.~~i.e. ADS-B, ADS-R, or TIS-B tracks) that are correlated with TCAS tracks and TCAS only tracks ~~should~~ **shall** include the Traffic TCAS Alert Status (i.e. no threat, proximity traffic, traffic advisory, resolution advisory).

2.2.2.5.2 Own-ship Information Output Requirements

The following subsections contain own-ship information output requirements from the ASSAP function to the CDTI.

2.2.2.5.2.1 Own-ship Horizontal Position

~~For the ASSA or FAROA applications (as a minimum) or if the Traffic Horizontal Position is provided as WGS-84 latitude/longitude, then t~~The ASSAP function **shall** ~~be capable of~~ provid~~inge~~ the Own-ship Horizontal Position based on WGS-84 latitude/longitude to the CDTI.

~~Note 1:~~ The Own-ship Horizontal Position data source ~~should~~ **shall** be ~~selected per DO-302 STP MOPS~~the same as the position source transmitted out by the ADS-B transmitter per RTCA DO-302 STP MOPS.

~~-~~The CDTI ~~should~~ **shall** use the Own-ship Horizontal Position provided by ASSAP since it represents the system'~~'~~s selected surveillance source. Note: CDTI implementations on MFDs must take careful considerations of data sources. For example the flight plan may be drawn based on different sources of own-ship horizontal position.

Note ~~2~~1: For the ASSA and FAROA applications, own-ship horizontal position is needed for positioning own-ship relative to an airport surface map.

Note ~~3~~2: ~~-~~If Traffic Horizontal Position is provided as WGS-84 latitude/longitude, Own-ship Horizontal Position is needed for positioning traffic relative to own-ship. ~~The Traffic Horizontal Position may be provided as relative range and bearing referenced from own-ship position; in this case, Own-ship Horizontal Position is not needed.~~

2.2.2.5.2.2 Own-ship Horizontal Velocity

For the EV App. application ~~(as a minimum)~~, the ASSAP function **shall** ~~be capable of~~ provid~~inge~~ the Own-ship Horizontal Velocity to the CDTI.

The Own-ship Horizontal Velocity data source **shall** be the same as the velocity source transmitted out by the ADS-B transmitter per RTCA DO-302 STP MOPS.

~~.~~The CDTI ~~should~~ shall use the Own-ship Horizontal Velocity provided by ASSAP since it represents the system'~~'~~s selected surveillance source. Note: CDTI implementations on MFDs must take careful considerations of data sources. For example, MFDs may already be displaying own-ship ground speed based on different sources.

Own-ship Horizontal Velocity **shall** be provided as either Cartesian coordinates of velocity (e.g. north and east velocity components) or as the magnitude of the own-ship horizontal velocity (own-ship ground speed).

Note 1: Own-ship Horizontal Velocity is used for displaying own-ship velocity vectors or own-ship ground speed.~~.~~

~~*Note 2: For the EV App. application, own-ship ground speed may also be used for display when the Traffic Closure Rate is not used.*~~

~~*Note 3: Own-ship Horizontal Velocity is also desired (optional) for the EV Acq., CD, ASSA, and FAROA applications.*~~

~~**2.2.2.5.2.3Own-ship Orientation (Optional)**~~

~~The ASSAP function may provide the Own-ship Orientation to the CDTI.~~

~~*Note 1: Based on the supported display orientation types, Own-ship Orientation can be provided as true heading, magnetic heading, true track angle, or magnetic track angle. Magnetic Variation may also be provided to limit the number of data parameters.*~~

~~*Note 2: When true or magnetic track angle is determined based on the Cartesian coordinates of velocity (e.g. north and east velocity components), the accuracy may be in question below some value (e.g. below 20 kts); therefore, the track angle data should be considered invalid.*~~

~~*Note 3: If Traffic Horizontal Position is provided as WGS-84 latitude/longitude, Own-ship Orientation is needed for positioning traffic relative to own ship. The Traffic Horizontal Position may be provided as relative range and bearing referenced from own ship position; in this case, Own-ship Orientation is not needed.*~~

~~2.2.3.5.3.4~~2.2.2.5.2.3 Own-ship Track Angle

The ASSAP function **shall** ~~be capable of~~ provid~~ing~~e the Own-ship Track Angle to the CDTI.

Own-ship Track Angle **shall** be provided as true track angle.

When true track angle is determined based on the Cartesian coordinates of velocity (e.g. north and east velocity components), the Own-ship Track Angle **shall** be considered invalid when the accuracy may be in question below the determined velocity threshold in the following table:

(Jonathan will provide a velocity threshold table for invalidating track angle based on the reported NACv)

Note ~~1~~: Own-ship Track Angle is used for calculating Traffic Directionality.

~~*Note 2: When true track angle is determined based on the Cartesian coordinates of velocity (e.g. north and east velocity components), the accuracy may be in question below some value (e.g. below 20 kts); therefore, the own-ship track angle data should be considered invalid. velocity threshold table for invalidating track angle based on the reported NACv*~~

~~2.2.3.5.3.5~~2.2.2.5.2.4 Own-ship Pressure Altitude

The ASSAP function **shall** ~~be capable of~~ provid~~inge~~ the Own-ship Pressure Altitude to the CDTI.

Note: Own-ship Pressure Altitude is needed for the CDTI to calculate traffic relative altitude when traffic actual pressure altitude is only provided or to calculate traffic actual altitude when traffic relative altitude is only provided.

~~2.2.2.5.2.6Own-ship Position Quality~~

~~For the ASSA and FAROA applications (as a minimum), the ASSAP function **shall** be capable of providing the Own-ship Position Quality to the CDTI.~~

~~*Note: Own-ship Position Quality is used for removing the airport surface map from the CDTI when the own-ship performance criteria are not met.*~~

~~2.2.3.5.3.7~~2.2.2.5.2.5 Own-ship Length/Width Codes (Optional)

For the ASSA and FAROA applications, the ASSAP function may provide the Own-ship Length/Width Codes to the CDTI.

The CDTI may have removed this requirement? If so, remove this section.

2.2.2.5.3 ASSAP Status Output Requirements

The following subsections contain ASSAP status output requirements from the ASSAP function to the CDTI.

2.2.2.5.3.1 ASA Application Status

The ASSAP function **shall** ~~be capable of~~ provid~~inge~~ the ASA Application Status to the CDTI.

~~As a minimum, t~~The ASA Application Status **shall** include that the ASA Application is one of the following five states: On, Available to Run, Unavailable to Run, Unavailable – Fault, or Not Configured.

Note: The ASSAP function should provide the ASA Application Status for the EV Acq., CD, ASSA, FAROA, and EV App. applications. The ASA Application Status represents the following:

1. *On: Application is on/running; required input data is available and meets the performance criteria.*

2. *Available to Run: Application is configured. Required input data is available and meets the performance criteria (This state represents that the ASA Application is manually or automatically selected off).*

3. *Unavailable to Run: Required Input data is available but does not meet the performance criteria or is not available due to NCD conditions.*

4. *Unavailable - Fault: Required Input data is not available due to a failure or the ASA Application process is failed.*

5. *Not Configured: Application is not installed.*

2.2.2.5.3.2 ASSAP Fault

An ASSAP Fault **shall** be provided to the CDTI when the required input data is not available due to a failure or the ASSAP process function is failed. For detailed fault requirements, reference Section 2.2.4.3 Monitoring.